Translation

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 020771WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/008575	International filing date (*day/month/year*) 02 August 2003 (02.08.2003)	Priority date (*day/month/year*) 06 August 2002 (06.08.2002)
International Patent Classification (IPC) or national classification and IPC B23P 9/02, F16C 3/08, B24B 39/04, 5/42, B23B 5/18		
Applicant HEGENSCHEIDT-MFD GMBH & CO. KG		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
08 March 2004 (08.03.2004)	29 April 2004 (29.04.2004)
Name and mailing address of the IPEA/EP Facsimile No.	Authorized officer Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/EP2003/008575

I. Basis of the report

1. With regard to the elements of the international application:*

☒ the international application as originally filed

☒ the description:

pages 1-8, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

☒ the claims:

pages 1-8, as originally filed

pages _____, as amended (together with any statement under Article 19

pages _____, filed with the demand

pages _____, filed with the letter of _____

☒ the drawings:

pages 1/4-4/4, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

☐ the sequence listing part of the description:

pages _____, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

V. **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-8	YES
	Claims		NO
Inventive step (IS)	Claims	1-8	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-8	YES
	Claims		NO

2. Citations and explanations

1. Reference is made to the following documents:

D1: DE 39 39 935 A (MAN NUTZFAHRZEUGE AG) 6 June 1991

D2: PATENT ABSTRACTS OF JAPAN Vol. 012, No. 292 (M-729), 10 August 1988 & JP 63 068325 A (KOMATSU LTD), 28 March 1988

D3: DE 199 19 893 A (JUNKER ERWIN MASCHINENFABRIK GMBH) 9 November 2000

D4: EP-A-1 211 026 (HEGENSCHEIDT MFD CORP) 5 JUNE 2002

2.1. Document D1 is considered the prior art closest to the subject matter of claim 1. It discloses (cf. column 1, lines 10-27; illustration; claim 1):
A method for finishing the bearing points on the main and connecting-rod bearing pins of the crankshafts of motor vehicle engines, said crankshafts having curvatures between the bearing points and the junctions abutting each of the bearing points, such as cheeks or thrust bearings, said curvatures being deep rolled with a deep rolling tool and the bearing points in question then being machined in a cutting operation.

A machining method such as this has the disadvantage that, during rolling, the diameter of the rolls

cannot be reduced to any desired size, and so the load-bearing surface of the bearing point is significantly narrowed by the relatively large radii of the turned grooves (curvatures).

The subject matter of claim 1 differs from D1 in that the bearing point in question is machined **with a small cutting depth whilst maintaining a distance to each respective junction.**

In this way, the favorable diffusion of residual compressive stress caused by deep rolling is only **slightly** reduced in the curvature, and wider bearing points are created.

Document D1 likewise discloses a further processing method in which the curvatures and the bearing point are machined simultaneously (by means of one specific tool). The radii of the curvatures are thus kept smaller, as a result of which the width of the bearing points is increased. The curvatures are subsequently hardened and the bearing points undergo final grinding. No deep rolling is disclosed, however.
Documents D2 and D3 (cf. figures 2-4; claim 1) disclose a machining (grinding) process while maintaining a distance from each junction, but these documents do not disclose deep rolling and do not mention the problem of the width of the bearing point.
Document D4 (cf. illustrations; paragraphs 13-18) proposes an embodiment of the rolling device that results in a wider bearing point.

The features of claim 1 are thus not suggested by the prior art.

Therefore, claim 1 fulfills the criteria for novelty and inventive step set out in PCT Article 33(1).

2.2. Claims 2-7 are dependent upon claim 1 and thus likewise satisfy the PCT requirements with respect to novelty and inventive step.

2.3. The crankshaft according to document D3 (cf. in particular figures 3 and 5) has tangent radii between the junctions and each of the bearing points.
However, this document does not disclose deep rolling, and the problem of the width of the bearing point is not mentioned.
The crankshaft according to claim 8 has deep rolled curvatures, which are considered differentiating features with respect to the prior art.

The features of claim 8 are thus not suggested by the prior art.
Therefore, claim 8 fulfills the criteria for novelty and inventive step set out in PCT Article 33(1).